A Worksite Smoking Modification Competition: Potential for Public Health Impact

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Abstract: We evaluated the effectiveness of a worksite smoking cessation/reduction program both with and without formal competition for monetary prizes in five worksites (n = 107). A greater percentage of eligible smokers participated in the competition (88 per cent) than the non-competition (53 per cent) condition. Treatment outcome among participants was generally equivalent across conditions, but at a six-month follow-up, nonabstinent subjects in the competition condition had lower levels of carbon monoxide than subjects in the non-competition condition. On a worksite-wide basis, a higher percentage of employees quit smoking in the competition condition (16 per cent) compared to the non-competition (7 per cent). (*Am J Public Health* 1986; 76:198–200.)

Introduction

Traditional smoking cessation programs have failed to attract large numbers of cigarette smokers[1] and have proven disappointing in terms of long-term effects. As a result, investigators have recently begun to explore treatments in worksite settings.[2–4] Evaluations of worksite smoking programs, however, have not produced uniformly positive results. Participation rates, if reported at all, are often very low* and abstinence rates rarely exceed those found in traditional clinic-based programs.[5–9] Clearly, more effective worksite interventions are needed.

Despite the success of competition-based programs in the area of worksite weight control,[10] there have been no controlled studies assessing the effects of competition in smoking modification programs. Thus, the purpose of the present study was to assess the incremental effects on both participation and success rates of adding a competition/incentive component to a worksite smoking modification program.

Method

Participants were recruited at four banking and one savings and loan institution (in Fargo, North Dakota) through a variety of sources. Recruitment procedures were identical in both conditions except that the competition condition was advertised as a "Healthy Contest". A quasi-experimental design was employed in which the savings and loan was assigned to a basic treatment program and the four banks were assigned to a competition plus basic treatment program. All worksites were financial institutions employing 115 to 180 employees. High return rates were obtained on a pretest questionnaire administered to all employees prior to the announcement of the program (89 per cent in competition condition; 86 per cent in non-competition). This questionnaire revealed no differences between the two conditions on age, sex, or socioeconomic status. Further, there were no pretest differences between the two conditions in the percentage of employees who smoked.

The savings and loan worksite (N = 16) received our basic smoking program (SP). This six-week cognitive-behavioral program has been successfully implemented in both worksite and clinic settings and is described in detail elsewhere.[8,9,11] In the SP + Competition condition, it was possible to take advantage of an existing competitive environment between the four local banking institutions. In addition to receiving our basic treatment program, the four bank presidents formally challenged each other at a press conference to see which institution could produce the greatest reductions in smoking among employees. Prizes to benefit all employees, were awarded in bank wide meetings to: (a) the bank with the highest participation rate ($100 prize); (b) the bank with the greatest success in reducing carbon monoxide (CO) levels at posttest ($150 prize); and (c) the bank with the greatest CO reductions at the six-month follow-up ($250 prize). The "grand prize", awarded to the bank with the highest cessation rate (confirmed by carbon monoxide and saliva thiocyanate levels) at follow-up, was a catered meal served to all employees of the winning bank by executives of the losing banks. Individual prizes for successful participants were also presented both at posttest and at the six-month follow-up (e.g., awards, certificates, and public recognition of success).

Participants in the SP + Competition condition were encouraged to wear buttons stating, "I'm in the Healthy Competition", to increase social support. Additionally, a large "Smoking Barometer" was placed in a prominent place (e.g., lobby) of each bank to provide employees with weekly feedback on how their bank compared with others on goals for that week.

To assess smoking status, multiple measures were employed. In addition to the worksite-wide survey mentioned previously, all participants completed a smoking history form and a smoking patterns questionnaire. Breath samples were collected and analyzed for CO levels[12] and saliva samples were assayed for thiocyanate to confirm self-reports of abstinence.[13]

Results

One-way analyses of variance on pretreatment scores revealed no differences between participants in the SP and SP + Competition conditions on any of the five main dependent variables (i.e., number of cigarettes smoked per day, nicotine content of brand, per cent of cigarette smoked, thiocyanate, and CO). However, subjects in the SP + Competition condition reported higher levels of nicotine dependence ($\bar{x}$ = 6.2; 95% CI: 5.7,6.7) on the Fagerstrom Tolerance Questionnaire[14] than the subjects in the SP Conditions ($\bar{x}$ = 4.9, 95% CI: 3.6,6.1).

Eighty-eight per cent (91 of 104) of the smoking employees in the SP + Competition condition entered the program, compared to 53 per cent (16 of 30) in the SP condition. Overall, 91 per cent (97 of 107) of subjects who began the

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TABLE 1—Difference Scores and Confidence Intervals for Pretreatment, Posttreatment, and Follow-up Scores

Variables	Pretreatment	Change pre- posttreatment	Change posttreatment 6 months	Change pretreatment 6 months
Per Cent Abstinent				
Competition	0%	−22%	4%	−18%
Non-Competition	0%	−31%	17%	−14%
Thiocyanate Levels				
Competition	164.06	31.80 (11.40,52.20)	−15.05 (−39.05,8.96)	18.93 (−1.71,39.57)
Non-Competition	158.43	21.20 (−44.77,87.17)	−47.25 (−113.47,18.97)	3.29 (−72.66,79.23)
Nicotine Content of Brand[a]				
Competition	.77 mg	.46 (.37,.55)	−.13 (−.21,−.04)	.35 (.26,.43)
Non-Competition	.66 mg	.20 (−.74,.47)	−.08 (−.36,.20)	.16 (−.11,.42)
Cigarettes per Day[a]				
Competition	24.7	17.25 (13.93,20.47)	−9.65 (−12.28,−7.02)	7.57 (4.56,10.57)
Non-Competition	24.9	19.20 (9.57,28.83)	−14.00 (−22.23,−5.77)	5.64 (−6.04,17.32)
Per Cent of Cigarette Smoked[a]				
Competition	.86	.23 (.15,.30)	−.22 (−.31,−.13)	.09 (.04,.13)
Non-Competition	.88	.20 (.06,.33)	−.23 (−.46,−.003)	.09 (−.03,.21)
Carbon Monoxide[a]				
Competition	33.9 ppm	17.9 (13.2,22.6)	−7.2 (−10.9,−3.5)	12.57 (8.2,16.9)
Non-Competition	31.1 ppm	12.8 (−.7,26.3)	−10.9 (−23.3,1.48)	4.36 (−10.2,18.9)

n = 107.
a) Analysis includes nonabstinent subjects only.

treatment completed the program, with no difference in attrition rates between the two conditions. As a result, a higher percentage of smokers in the SP + Competition condition completed treatment.

At posttest, 22 per cent (20 of 91) of the subjects in the SP + Competition and 31 per cent (5 of 16) of the subjects in the SP condition had achieved complete cessation (verified by CO levels of < 8 ppm), a minor between-groups difference. It was possible to contact 97 per cent of participants who completed the program for follow-up. At the six-month follow-up, 14 per cent of the participants in the SP condition were still abstinent, compared to 18 per cent of the participants in the SP + Competition condition. Overall, the SP + Competition condition had a greater impact on the smoking rates worksite-wide than did the SP condition: 16 per cent of all smokers quit smoking in the SP + Competition worksites compared to 7 per cent of all smokers in the SP worksite.

In order to avoid confounding of results due to smoking reductions with those due to abstinence, subjects who achieved abstinence were excluded from the remaining analyses. Table 1 presents the data for nonabstinent subjects in both conditions. As can be seen, by the six-month follow-up, subjects in the SP + Competition condition had lower CO levels than subjects in the SP condition. The self-report measures of smoking behavior also favored the SP + Competition condition at follow-up, although these differences were not reliable.

Repeated measures ANOVA revealed major reductions for both conditions on all of the targeted smoking behaviors and on CO levels from pre- to posttreatment. At the six-month follow-up, correlated t-tests revealed that nonabstinent subjects in both conditions had relapsed from posttest on all variables (although they were still importantly improved from baseline).

Discussion

The current study is one of the few controlled worksite investigations that reports on participation and attrition rates, worksite-wide effects, and includes biochemical verification of smoking status. The results indicate that a competition-based smoking intervention resulted in higher participation rates and equivalent attrition and outcome rates, compared to the same smoking program without the competition component. Nicotine addiction levels were higher in the competition program, perhaps suggesting that smokers more resistant to intervention were attracted to the program. Most important from a public health standpoint, 16 per cent of smokers in the worksites that received the competition program quit smoking by the six-month follow-up, compared to 7 per cent of smokers in the non-competition worksite.

In summary, it appears that competition-based programs may attract larger numbers of smokers than traditional smoking control programs. Future research is needed to replicate these findings using randomized trials and a greater number of worksites. In addition, research is needed on organizational characteristics (e.g., degree of support from top management, labor-management relations) that may affect participation or outcome. Competition-based programs appear to hold promise for worksite health promotion.

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